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STRUCTURAL EQUATION MODELING TO STUDY THE FACTORS INFLUENCING USAGE OF IT BASED BANKING FACILITIES BY MSEs IN SANKARANKOIL TALUK

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Abstract

Tamil Nadu accounts for the largest number of (15.07%) Micro, Small and Medium Enterprises (MSMEs) in the country with 6.89 lakhs registered MSMEs. Hence, MSMEs must be assured of organized credit from the Indian banking system, and it requires a medium to ensure the credit system which is found to be e-banking facility. A sample survey was conducted during Dec. 2013 to Jan. 2014, to ascertain the variables linked to e-banking practice of rural based MSEs in Sankarankoil taluk, Tirunelveli district. The current study aims to find the causal relationship among the latent variables (factors) confirmed in confirmatory factor analysis, namely, 'bank usage' that constitutes measured variables of IT based banking facilities by the rural customers, namely, MSEs of study area through the structural model/path analysis of SEM.

Key Words: *e-banking, MSEs, SEM.*

Introduction

MSMEs - Indian Scenario

In India, the Micro, Small and Medium Enterprises play a pivotal role in the overall industrial economy of the country. It contributes 8 per cent of the country's Gross Domestic Product, 45 per cent of the manufactured output and 40 per cent of its exports. The MSM enterprises provide employment to about 60 million persons through 26 million enterprises.

As per the MSMED Act in India, the enterprises are classified into manufacturing and service enterprises based on their investment in plant and machinery / equipment (excluding land and building) as indicated below:-

Manufacturing Enterprises

- Micro Manufacturing Enterprises -- Up to Rs.25 lakhs.
- Small Manufacturing Enterprises -- Above Rs.25 lakhs & up to Rs.5 Crores.
- Medium Manufacturing Enterprises -- Above Rs.5 Crores & up to Rs.10 Crores.

Service Enterprises

- Micro Service Enterprises – Up to Rs.10 lakhs.
- Small Service Enterprises – Above Rs.10 lakhs and up to Rs.2 Crores.
- Medium Service Enterprises – Above Rs.2 Crores and up to Rs.5Crores.

Rural Banking

The role of banks, which is central to formal credit in rural areas, has been fast changing. The emergence of new technology allows access to banking services without physical direct recourse to the bank premise by the customer. The ATMs are city oriented in our country. It is inevitable that ATMs could be widely used, in semi-urban and rural areas. As the increased popularity of credit cards which is bound to reach rural areas, and as the level of education in rural areas rises, customers will start seeking efficient, quicker and low cost services.

The growth of the rural banking industry fosters financial inclusion by providing financial products and services to people in the farthest reaches of the country. In India, even now, the rural areas are lacking in access to basic financial services. E-banking is gradually replacing the traditional branch banking system. Today, the concept of core banking has made 'Anywhere and anytime' banking a reality. Along with technology, banking services have also evolved and the delivery of various banking products are carried out through the medium of high technology at a fraction of the cost to the customer.

Online Banking

Online banking is an electronic payment system that enables customers of a financial institution to conduct financial transactions on a website operated by the institution, such as a retail bank, virtual bank, credit union or building society. Online banking is also referred to as Internet banking, e-banking, virtual banking, and also by other terms. As finance is an important input, the MSEs must be assured of organized credit from the Indian banking system.

Review of Literature

Nishi Sharma[1] explored different factors that might be interrupting the burgeoning development of e-banking in rural areas. The study found that approximately 72% feel uncomfortable in transacting with e-banking because of language problem. Most of them were also not aware of multi-language provision in e-banking.

Santosh. B. Potadar et. al. [2] examined the illiteracy of rural bank customer and by designing the model how it will be helpful to them while carrying the internet banking transactions and also it will be helpful to banking sector to get a benefit from rural areas bank customers to explore a banking industry .

Jamaluddin.N[3] concluded that the emerging payment system in India for large value transactions is RTGS, ECS for bulk payments and NEFT for one to one fund transfer. Among the card based payment systems, debit card is more popular than credit card. It was the potential for delivering banking services through mobile phones is immense compared to internet as a delivery channel.

Problem and Objective of the Study

The above studies have not clearly identified the effect of each factor on the usage of IT based banking facilities by the MSEs in a rural based region like Sankarankoil taluk in Tamilnadu. The objective of the present study is to find causal relationship among the latent variables (factors) confirmed in confirmatory factor analysis, namely, 'bank usage' that constitutes measured variables of IT based banking facilities by the rural customers, namely, MSEs (in Sankarankoil Taluk, Tirunelveli district), through the structural model/path analysis of SEM.

Data and Methodology

- **I. Design of Research** : Descriptive Research
- **II. Source of Primary Data** : Sample Survey
- **III. Data Collection Instrument** : Questionnaire
- **IV. Sampling Design**
  - **a. Sample Size** : 51 MSEs
  - **b. Sampling Area** : Sankarankoil taluk, Tirunelveli district
  - **c. Sampling Unit** : MSEs
  - **d. Sampling Method** : Quota Sampling
- **V. Tools for Analysis**
  - a. Percentage calculation
  - b. Confirmatory factor analysis and Path analysis of SEM

Hypothesis

H_0 : The measurement model of structural equation modeling (SEM) is perfectly right.

Results and Discussion

The analysis of survey data reveals that a majority of MSEs in the study were partnership firms. The markets of the MSEs were regional and state level rather than local market. Most of the MSEs were taken on lease.

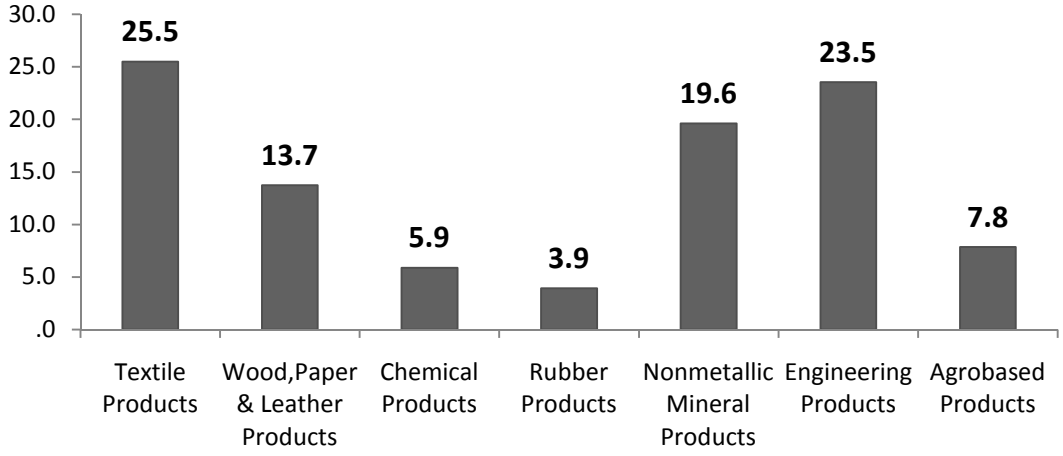
Table 1: Details of MSEs

Nature of Firm		Market Spread		Method of acquiring Firm	
Nature of Firm	**Percent**	**Market**	**Percent**	**Method**	**Percent**
Sole proprietor	41.2	Local	9.8	Taken on Lease	60.8
Partnership	51.0	Regional	45.1	Outright Purchase	17.6
Family Business	7.8	State-wide	45.1	Inherited	21.6
Total	**100.0**	**Total**	**100.0**	**Total**	**100.0**

Source: Field Survey

The product line of the MSEs under study is shown in Figure 1. It shows most of the MSEs are turning out the engineering products and textile products.

Figure 1: Product line of MSEs

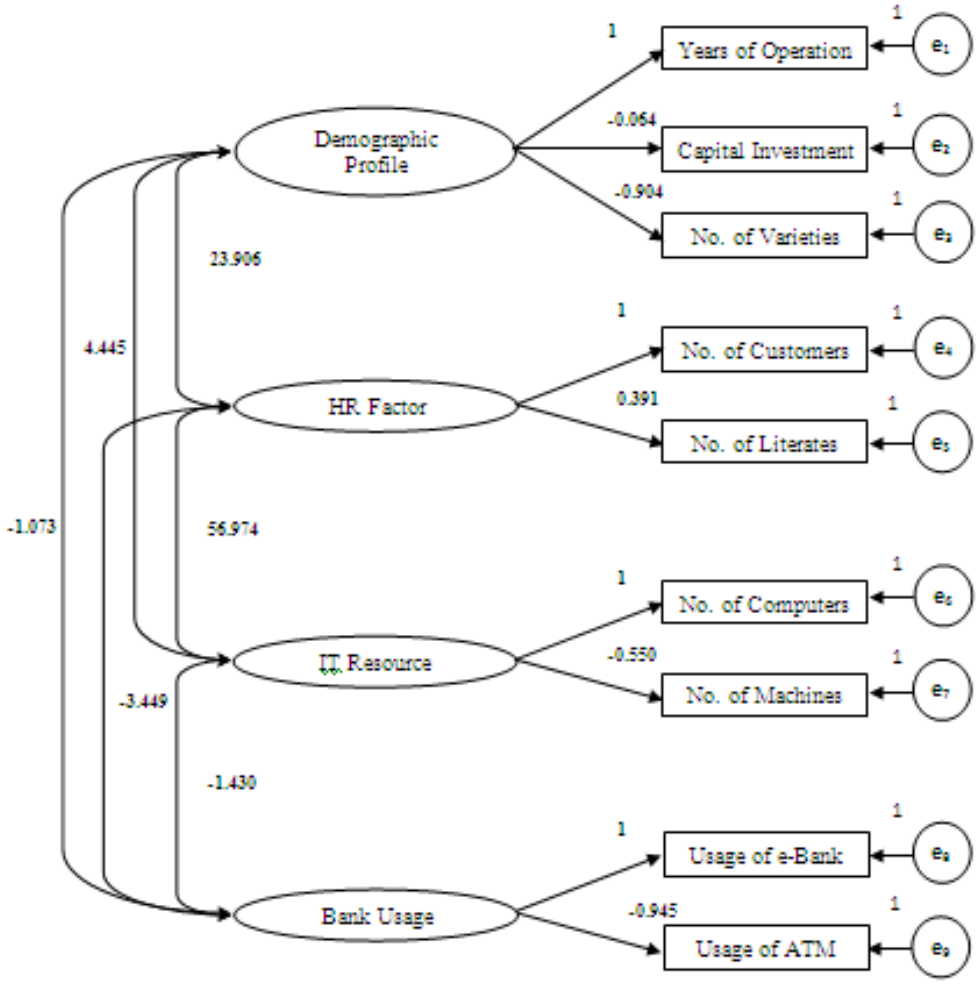


Source: Field Survey

Structural Equation Modeling (SEM)

The Structural Equation Modeling (SEM) has the two steps approach, namely, measurement model and structural model. It is hypothesized that the measured variables (indicators) actually represent the respective latent variable, otherwise known as factor. The null hypothesis means that the measured variables or indicators represent the factor concerned, that is, CFA can be used to test the hypothesis that each factor in the measurement model is composed of the above observed variables. It is understood that each factor has multiple measured variables. For example, the first factor demographic variable has three variables such as Years of Operation, Capital investment and Number of product varieties. Similarly, the other three factors have the concerned variables as shown in Figure 2.

Figure 2 - Path Diagram
Measurement Model Showing Factors Linked to Usage of it based Bank Resources by Rural MSEs



Note: e is the error term, that is, the cause outside the model

Step 2 in SEM involves path analysis or validation of structural model. Path analysis and related techniques are referred as "causal modeling" because the technique allows us to test theoretical propositions about cause and effect without manipulating variables. Path coefficient comes from a serious of multiple regressions rather than from just one

regression. It indicates the direct effect of a variable assumed to be a cause of another variable assumed to be an effect.

As first step, the present authors have validated measurement model by confirmatory factor analysis (CFA). For this, a priori the four factors (latent variables) of 'Demographic profile', 'HR factor', 'IT Resource' and 'Bank Usage' with their constituent measured variables obtained from the questionnaire were hypothesized. CFA (as first step of SEM) confirmed the measurement model / theory (please vide Fig. 2), namely, the nine measured variables/indicators represent the four factors which cause/impact the usage of bank resource by the rural based MSEs.

Evaluating the fit - Model Fit Summary

Fit refers to the ability of a model to reproduce the data (i.e., usually the variance-covariance matrix). A good-fitting model is one that is reasonably consistent with the data and so does not require re-specification. Also a good-fitting measurement model is required before interpreting the causal paths of the structural model. The fit indices obtained from the model fit summary from AMOS are shown in the following two tables – 2 & 3.

Table 2: Computation of degrees of freedom

Number of distinct sample moments	45
Number of distinct parameters to be estimated	24
Degrees of freedom (45 - 24)	21
Chi-square and Standardized RMR	
Chi-square	22.957
Degrees of freedom	21
Probability level	0.746
Standardized RMR	0.0883

Source: Primary data. Results computed by the package – AMOS

The chi square value is insignificant with p- value of 0.746, which implies the model is fit. The value of standardized Root Mean square Residuals (SRMR) is below 0.10 which shows the adequacy for model fit.

Table 3: Fit Indices for Various Models

Model	CMIN/DF	CFI	GFI	RMR	IFI	RMSEA
Default model	1.093	0.986	0.916	0.002	0.988	0.043
Saturated model	1.000	1.000	1.000	0.000	1.000	-------
Independence model	4.978	0.000	0.690	0.005	0.000	0.282
Standards	**<2.00**	**>0.90**	**> 0.90**	**<0.05**	**>0.95**	**<0.05**
Remarks	GOOD FIT	GOOD FIT	GOOD FIT	GOOD FIT	GOOD FIT	GOOD FIT
Results for Default model compared with the Standards						

Source: Primary data. Results computed by the package – AMOS

The evaluation of the best fit indices (table 3) shows that the indices minimum value of the discrepancy, C divided by degrees of freedom, DF (CMIN/DF), Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Root Mean square Residuals (RMR), Incremental Fit Index (IFI) and Root Mean Square Error of Approximation (RMSEA) satisfied the standards showing that the target model is the best fit.

Performing Path Analysis for testing Structural Model

In the diagram given below, it can be seen that the latent variables Demographic Profile, HR factor and IT resource are having the impact on Bank Usage ; that is, the path coefficients from the above first three variables are leading to Bank Usage (straight single headed arrows to bank usage).

The model is formulated as given below:-

Bank Usage = β_{11} Demographic Profile + β_{12} IT Resource + β_{13} HR Factor + er_3

IT Resource = β_{21} Demographic Profile + β_{22} HR Factor + er_2

HR Factor = β_{31} Demographic Profile + er_1

Decomposition of Correlations between Endogenous and Exogenous Variables

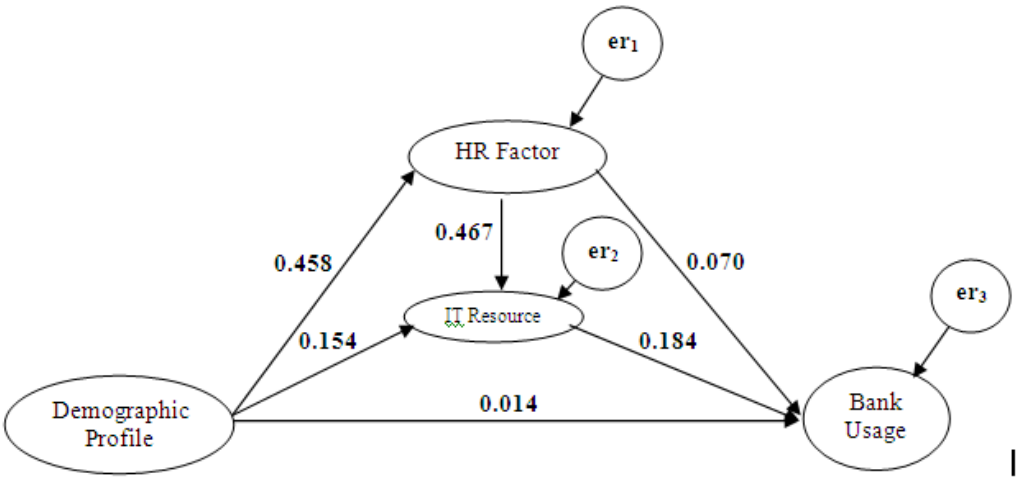
The relationship among variables is explained from the estimates of Unstandardized co-efficient given in table 4. Here, the path coefficient of 0.458 determined by holding other variables as constant for Demographic Profile represents positive effect on HR Factor indicating that the HR factor would increase by 0.458 for every unit increase in demographic profile and this coefficient value is significant at 5% level. IT resource causes major impact on Bank usage.

Table 4: Path coefficients in SEM

Variables/Indicators			Unstandardized co-efficient		Standardized coefficient	C.R.	P
			Esti-mate	S.E.	B		
HR Factor	<---	Demographic Profile	0.458	0.172	0.484(β_{31})	2.66	0.046
IT Resource	<---	Demographic Profile	0.154	0.048	0.230(β_{21})	3.21	0.038
IT Resource	<---	HR Factor	0.467	0.204	0.647(β_{22})	2.29	0.017
Bank Usage	<---	Demographic Profile	0.014	0.004	0.021(β_{11})	3.50	0.038
Bank Usage	<---	IT Resource	0.184	0.053	0.218(β_{12})	3.47	0.042
Bank Usage	<---	HR Factor	0.070	0.021	0.085(β_{13})	3.33	0.006

Source: Primary data. Results calculated by the package – AMOS

Figure 3 - Path Diagram
Structural Model Showing Unstandardized Estimates of Factors Linked to Usage of It Based Bank Resources by Rural MSEs



Note: The latent variables with their indicators (measured variables) are not shown in the Path diagram for the purpose of clarity

Decomposition of Effects

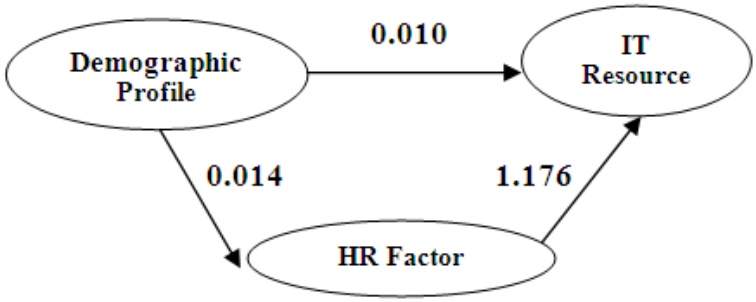
The present researchers aim to find the total effect of the independent variable, which can be divided into direct effects (no intervening variables involved) and indirect effect (through one or more intervening variables), on the dependent variable using the below formula

Total Effect of Variable 1 on Variable 3 = Indirect Effect + Direct Effect

Direct Effect -> Value of Path Coefficients of Variable 1 to Variable 3

Indirect Effect = Direct Effect of Variable 1 on Variable 2 x Direct Effect Variable 2 on Variable

Figure 4: Path Analysis Diagram Standardised effects



For example, considering the three variables such as Demographic Profile, HR factor, and IT resource as given in Figure 4, the total effect of demographic profile on IT Resource is influenced by the indirect (mediation) effect of HR factor and the direct effect of demographic profile on IT resource. The calculation is summarized below.

Direct effect of demographic profile on IT resource	**= 0.010**
Indirect effect of demographic profile on IT resource	
(Direct effect of Demographic profile on HR factor (0.014) x	**= 0.017**
Direct effect of HR factor on IT Resource (1.176))	
Total effect of demographic profile on IT resource	**= 0.027**

The total effect of demographic profile on IT resource 0.027 is higher than direct effect of demographic profile on IT resource which is 0.010. The indirect effect of 0.017 (through mediation effect of HR factor) also contributes to the total effect of demographic profile on IT resource. The value of total effect of demographic profile on IT resource 0.027 is positive and represents a high influence of family demographic profile on IT resource. The total effects of other variables are summarized in table 5.

The total effect of demographic profile on bank usage is 0.015 (0.006+0.009) which is constituted largely be indirect means (0.009) rather than the direct effect of 0.006. HR factor affects the bank usage largely with the value of 0.529. The third factor IT resource shows moderate effect among the other three variables with value of 0.183.

Table 5: Standardized Effects on the Variables

Effect	Variables	HR Factor	IT Resource	Bank Usage
Direct effect	Demographic Profile	0.014	0.010	0.006
	HR Factor	---	1.176	0.314
	IT Resource	---	---	0.183
Indirect effect	Demographic Profile	---	0.017	0.009
	HR Factor	---	---	0.215
	IT Resource	---	---	---
Total effect	Demographic Profile	0.014	0.027	0.015
	HR Factor	---	1.176	0.529
	IT Resource	---	---	0.183

Source: Primary data. Results calculated by the package – AMOS

Suggestion and Conclusion

HR factor exhibits a strong effect on the Bank usage. The latent variable HR factor is constituted by two observed variables namely, number of customers and number of computer literates. CFA signified the standardized regression weights value of 0.653 for the variable number of computer literates among the two variables of the factor 'HR factor'. Thus it could be well suggested that the increase in number of computer literates employed in MSEs could very well boost the usage of IT based bank resources. The literacy on computer among the employees could be increased by training given to them.

Scope for Further Research

The present research involved only the rural based MSEs in Sankarankoil taluk, Tirunelveli district as the samples to study their e-banking usage. The study has not concentrated on the other rural users of e-banking facility. Hence further research could be carried out on studying the underlying factors affecting the e-banking usage by the other rural inhabitants.

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